Math Reviewer

Common Monomial Factor

Factoring Greatest Common Monomial Factor:

- Factoring polynomials is the reverse process of finding the product of two or more polynomials of smaller degrees.

Factoring and GCF:

- The Greatest Common Factor (GCF) of two or more monomials is the **Common Factor** having the greatest numerical factor and with variables having the least degree. Thus, the term ax^n is the GCF of a polynomial if:
  1. a is the Greatest Integer that divides each of the coefficients of the polynomials.
  2. n is the Smallest Exponent of x in all the terms of the polynomial.
- PS: The exponent is separate and functions independently from the literal coefficient.

Example of Equation:

Expressions:	CMF:	FF:
$4x^2-6x^3$	$2x^2$	$(2-3x)$
$12x+18x^2$	$6x$	$(2+3x)$
$17x^2y^2-3xy$	Xy	$(17xy-3)$
$40y^3+16$	8	$(5y^3+2)$
x^4+y^4	$Prime$	
$9x^4+3x^4y$	$3x^4$	$(3+y)$
$x^4y^3+x^3y^2$	x^3y^2	$(xy+1)$

Explanation of Equations Above:

- **Common Monomial Factor:**
  a. Find the Greatest Common Factor of the numerical coefficients; if there are none, then it is 0.
  b. Find the common literal coefficients of the polynomials; if there are none, then there are no literal coefficients.
  c. Find the lowest exponent; if there are none, then the exponent is 0.
- **Factored Form:**
  a. Divide each polynomial to the Common Monomial Factor.
  b. Subtract the exponents (if there are any) to the CMF.
  c. Copy the same sign.

Difference of Two Square

Factoring the Difference of Two Squares (DTS):

- For a binomial to be a difference of two squares two conditions must hold.
  a. There must be two terms that are both squares. (Example: $9a^2 \wedge 25a^4$)
  b. There must be a minus sign between the two terms
- The following examples of the difference of two squares:
  a. $9x^2-49$
  b. $100-81m^6$

c. $-25a^2+4$

Formula:	**Explanation of Equation:**
• $x^2-y^2=(x+y)(x-y)$	• Find the square root of the numbers first. • The exponents will be removed.
Examples: • $9x^2-49=(3x+7)(3x-7)$ • $x^2-16=(x+4)(x-4)$ • $25y^2-36z^2=(5y+6z)(5y-6z)$	

Difference of Two Cubes

Factoring the Sum and Difference of Two Cubes:

- When $25x^2-10x-4$ is multiplied by $5x+2$, the result is $125x^3+8$
  a. $(5x+2)(25x^2-10x+4)=125x^3+8$
- When $25x^2+10x-4$ is multiplied by $5x+2$, the result is $125x^3-8$
  a. $(5x+2)(25x^2-10x+4)=125x^3-8$
- The expressions $125x^3-8$ and $125x^3+8$ are the sum of two cubes (STC) and difference of two cubes (DTC), respectively.

Formula:	**Explanation of Equation:**
• **Factoring Sum of Two Cubes** $x^3+y^3(x+y)(x^2-xy+y^2)$ • **Factoring Difference of Two Cubes**: $x^3+y^3(x-y)(x^2+xy+y^2)$	• Find the cubed root of the numbers first. • After finding the cubed root, square the x and y then multiply them to get the middle.
Example of Equation: • $8n^3+343p^3=(2n+7p^2)(4n^2-14np^2+49p^4)$ • $64n^3+b^3=(4a-b)(16a^2+4ab+49p^4)$ • $27c^9-\frac{1}{8}=(3c^3-\frac{1}{2})(9c^6+\frac{3}{2}c^3+\frac{1}{4})$	

Perfect Square Trinomial

Factoring Perfect Square Trinomial:

- Factoring a perfect square trinomial is the backward process of squaring a binomial.

- In perfect square trinomial, both the first and last terms are squared terms and the middle term is twice the product of the bases (square roots of the first and last terms).
- The following are perfect square trinomials.
    a. $x^2+12x+36$: The first and last terms are both squared $(x)^2$ and $(6)^2$. The middle term is twice the product of the bases: 2(x)(6)
    b. $9x^2+24xy+16y^2$: The first and last terms are both squared: $(3x)^2$ and $(4y)^2$. The middle term is twice the product of the bases: 2(3x) (4y)
    c. $4m^2-4m+1$: The first and last terms are both squared: $(2m)^2$ and $(-1)^2$. The middle term is twice the product of the bases: 2(2m) (-1)

Formula:	**Explanation of Equation:**
• $a^2+2ab+b^2=(a+b)^2$ • $a^2-2ab+b^2=(a-b)^2$	- The fractions are merely a graphic representation and does not mean they are or will be divided. - 12 has no square nor cubed root.
Examples: • $\frac{x^2+18x+81}{x(2)(9x)9}=2(x+9)^2$ • $\frac{4a^4-12a^2b+9b^2}{(2a)^2(3b)}=2(2a^2-3b)^2$ • $\frac{25x^2-10x-1}{(5x)^2?}=Prime$	